RED SHEET

California Department of Forestry and Fire Protection

Fire Safety Briefing
San Bernardino National Forest, CDF San Bernardino, Riverside, and San Diego Units

July 15, 2003

California Southern Region

Lookouts Communications Escape Routes Safety Zones

California Department of Forestry and Fire Protection
California Southern Region Operations Center
Fire Safety Briefing
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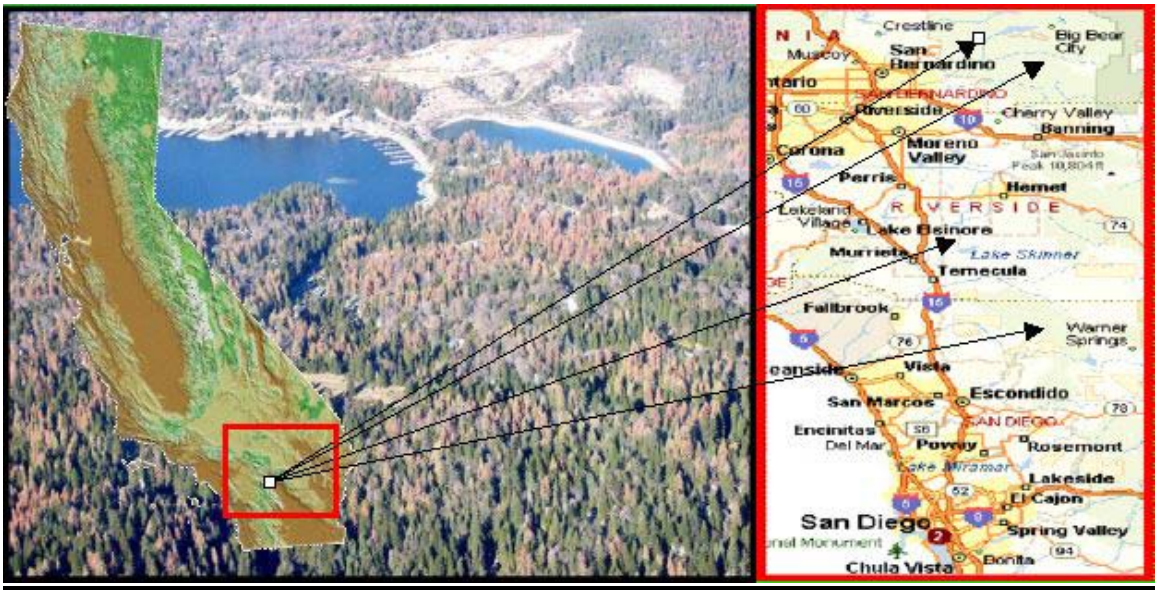

Weather and Climate

The area saw near to above normal precipitation this last winter with the exception of the mountain region which received below normal precipitation and snowfall. The region in general has experienced four years of drought with the 2002 winter being the driest in recorded history. Below normal temperatures and near normal precipitation throughout most of May-June resulted in a fine fuel crop that is continuous and is expected to be fully cured in early July. This has delayed the onset of active burning but has added to fuel continuity. The forecast for this fire season is for warmer than normal temperatures and dry conditions. This has the potential to drive Energy Release Components to record levels.

Fuels Assessment

1,000 hour dead fuel moisture has been at below normal levels through the spring and is currently ranging around the recorded lows at stations from the Inyo to the Cleveland NF. The presence of grasses increases the volume and continuity of the fine fuels present, especially in desert areas that have had minimal fuels present in recent years. Approximately 350,000 acres in and around the San Bernardino NF has experienced significant mortality in timber and brush. The area around Lake Arrowhead has timber fuel loadings as high as 568 stems/acre.

Fuels Assessment (continued)

A fire ecologist has theorized that this area can sustain approximately 40 stems per acre. By comparison the Peshtigo Firestorm occurred in an area that had 640 stems per acre.

Fire danger conditions are increasing severely, combining the dry grass and high ignition potential in grassy areas with a number of other factors that are likely to result from continued drying and forecasted above normal temps. These conditions include above normal Energy Release Components (ERCs) that could be at near or above record high levels and 1,000 hour fuel moistures that could approach or exceed record lows.

Grasses: Grasses have increased volume and continuity, especially in the desert areas. Expect quick ignition and rapid rates of spread with flame lengths of 5-12 feet. Spotting distances up to a ½ mile is possible.

Chaparral: Expect live fuel moistures to drop below the critical threshold of 60% around mid to late July. When this threshold is met expect aggressive burning with flame lengths of 17-37 feet, especially in areas where fuels, slope, and wind are aligned. Spotting distances of up to 1 mile can be expected. These are typical conditions for brush fires, however in standing dead chaparral there will be rates of spread and intensities that exceed these predictions. There are no models for standing dead vegetation or for predicting fire behavior associated with it.

Timber: Crown fire potential is very high. This will range from passive crowning (torching of individual or small groups of trees) to active crown fire (the entire surface/canopy fuel complex becomes involved) and possibly to an independent crown fire (one that burns in canopy without the aid of a supporting surface fire).

There is a 100% probability of crown fires occurring in dead standing trees.

Initial attack resources will be instrumental in keeping fires out of crowns. Firefighters need to recognize and be aware of the transition from a surface fire to a crown fire.

Passive crowning is likely in many areas. Wind and slope will dictate whether an active crown fire occurs. If 20-foot wind speeds are below 7 mph on flat ground or gentle slopes then moderate spotting distances of up to ½ mile are possible. The same could be said with little or no wind on slopes less than 50%.

If a surface fire establishes and slopes greater than 50% and/or wind speeds greater than 7 miles per hour occurs an active crown fire is probable, which can move into an independent crown fire. Currently, fuel moistures are below 100%.

Fuels Assessment (continued)

Live fuel moistures at 125% and below exhibit extreme fire behavior including crowning, spotting, and potential development of a plume-dominated fire. These conditions are explosive and are extremely dangerous conditions for firefighters.

Fire Behavior

The combination of heavy vegetation mortality, heavy fuel loading, low live fuel moistures, low 1,000 hour fuel moistures and the fire weather outlook of above normal temperatures all indicate a high potential for extreme fire behavior.

Trigger Points for Extreme Fire Behavior

Extreme fire behavior trigger points developed using the USFS Pocket Cards are:

- Relative humidity below 25%
- 20-foot winds at 7mph or greater
- 1,000 hour fuel moistures below 8% are considered explosive conditions
- Burning index of 50 or greater in 1000-hour fuels

Fire Behavior Assessment

There is a landscape-level mortality of 5-100% in the timber and chaparral over approximately 350,000 acres. Standing and down dead fuel loadings could range up to several hundred tons per acre. Die off of grasses and critical fuel moistures in chaparral should be reached in mid to late July. Fuel moisture in the 1,000-hour fuels is below the 20-year average and dropping. New record lows are anticipated starting in July.

The mountaintop is heavily urbanized and many of the structures have wood siding, decks, flammable roofs and flammable vegetation close by including standing dead trees. Due to the spacing of homes, slopes, and narrow road systems burning is likely to be more characteristic of urban conflagration rather than a typical wildland/interface fire.

Plume-Dominated Fire

The potential for a plume-dominated fire is extremely high; this is due to the heavy dead fuel loading of the landscape and the potential for crown fire. Plume-dominated fires can include crowning or can be caused by crowning when wind or slopes are no longer pushing the fire. Common characteristics of a plume-dominated fire are:

- Large fires or rapid spread
- Fire spread is a function of the fire itself, not the wind
- Upper level winds at 10,000-feet below 20 mph
- Convection column is well developed, sometimes reaching 20,000+ feet
- Strong updrafts during rapid growth and strong downdrafts after air cools in the upper atmosphere causing air to descend rapidly (column collapse) causing strong downdrafts
- Spotting is not long distance but can be profuse and in all directions
- Whirlwinds are typical around the perimeter

Urbanized Forest Communities

A rapidly spreading wildfire coupled with a lack of defensible space may result in many structures burning simultaneously. Structure protection may not be possible. Sizing up each situation and triaging structures will be extremely important before committing to any structure protection. Fire behavior will be influenced not only by forest fuels but also by the extreme intensity of multiple burning structures.

Expect extreme fire behavior conditions with the potential of homes being a carrier of fire. Hazardous materials, electric and gas lines, and propane tanks will also be a factor.

Safety

The **"10 Standard Fire Fighting Orders"** must be followed as well as the **"Eighteen Watch-out Situations."** Make it a priority to review the **"Wildland Urban Watch-outs"**, the **LCES Checklist**, the **"Structure Go-No Go / Protection Reference",** the **"Common Denominators of Fire Behavior on Tragedy Fires** and utilize **the "Pre-Incident Assignment Checklist"** (see attachments). Take the time to ensure, and promote a safe working environment, review the following safety points and remember; awareness, safety, and responsibility….it works.

- "Sheltering-in-Place" procedures (both civilian and fire personnel)
- Remain mobile, no supply lines unless crew safety is compromised. When employing protection tactics always back-in apparatus and always employ a backup person.
- Structure Protection requires the use of appropriate structure personal protective equipment (PPE).
- Observe vertical hazards (power lines, falling trees, etc.)
- Strike Team Leaders should scout high danger areas prior to deploying engines/equipment
- Exercise extreme caution when deployed to areas of limited ingress/egress, high concentration of bug kill, limited or poor water resources, etc.
- Wood constructed structures with shake roofs may burn intensely and extremely quick. Flying brands from burning roofs may continue downwind igniting additional structures.
- Situations involving crowning, large flame heights and erratic fire behavior can extend in an unpredictable manner, beyond the control of any number of personnel. Do not overextend your personnel, or resources. Anticipate resource needs, and order early.
- Winds of 25+ mph increase the chance of spotting over the heads of firefighters, and trapping them between both fire areas. Winds also cause greater preheating of fuels in the path of a fire front.
- When necessary and if time permits attempt to create a defensible space around structures; remember that structures on slopes will require greater clearance.

Safety (continued)

- Snags are one the overall top killers of Wildland Firefighters in California. Snags by themselves are quite hazardous; when on fire they become extremely dangerous. Do not attempt to fall a snag unless you are qualified to do so. When performing structure protection in and around snags you should post additional lookouts. Place your engine in a position that it will not be blocked or hit by falling snags. Prior to engine placement size up all snags and mark accordingly, either with the standard green and white “Killer Tree” flagging or by yellow and black hazard tape.

- Evacuation responsibilities can task firefighters from their fire suppression activities, and may distract attention from fire behavior at a time when that focus may be most critical. If possible, utilize law enforcement resources for evacuation needs, especially when establishing perimeter controls.

- When faced with canyon slopes or "chimneys" with slopes of 30% or more and continuous, flashy fuels the rate of spread of any fire can quickly extend beyond initial containment.

- Reduced or poor access with narrow, one-way roads could trap apparatus and personnel before they can safely egress the area. Ensure that you always provide for exits. Do not block ingress/egress to others.

- Always maintain a reserve water supply sufficient to protect your apparatus and personnel. Anticipate the need for additional water resources and evaluate the availability of such.

- Deploy no more than 300’ of hose

- Use a minimum of 1 1/2 “ hose

- Heavy fire apparatus may exceed the normal capacity of rural bridges. Apparatus Operators need to remain alert to changing road and vehicle conditions, and pay close attention to posted load limits.

- When employing safety zones they should be large enough so that the distance between the firefighters and flames is at least four times the maximum flame height in all directions per firefighter. This is for radiant heat only. There are no studies for convective heat generated from slope, wind gusts, fire whirls, and turbulence. Safety zones in these areas would have to be much larger.

Attachments:

10 Standard Fire Orders
18 Watch-out Situations
Wildland Urban Watch-outs
LCES Checklist
Structure Go-No Go / Protection Reference
Common Denominators of Fire Behavior on Tragedy Fires
Pre-Incident Assignment Checklist

TEN STANDARD FIRE ORDERS

FIRE BEHAVIOR

1. **Keep informed on fire weather conditions and forecasts.**

2. **Know what your fire is doing at all times.**

3. **Base all actions on current and expected behavior of the fire.**

FIRELINE SAFETY

4. **Identify escape routes and safety zones, and make them known.**

5. **Post lookouts when there is possible danger.**

6. **Be alert. Keep calm. Think clearly. Act decisively.**

ORGANIZATIONAL CONTROL

7. **Maintain prompt communication with your forces, your supervisor and adjoining forces.**

8. **Give clear instructions and insure they are understood.**

9. **Maintain control of your forces at all times.**

IF YOU CONSIDER 1-9, THEN

10. **Fight fire aggressively, having provided for safety first.**

Lookouts Communications Escape Routes Safety Zones

18 Watch-outs Situations

1. Fire not scouted and sized up.
2. In country not seen in daylight.
3. Safety zones and escape routes not identified.
4. Unfamiliar with weather and local factors influencing fire behavior.
5. Uninformed on strategy, tactics, and hazards.
6. Instructions and assignments not clear.
7. No communication link with crewmembers/supervisors.
8. Constructing line without safe anchor point.
9. Building fireline downhill with fire below.
10. Attempting frontal assault on fire.
11. Unburned fuel between you and the fire.
12. Cannot see main fire, not in contact with anyone who can.
13. On a hillside where rolling material can ignite fuel below.
14. Weather is getting hotter and drier.
15. Wind increases and/or changes direction.
16. Getting frequent spot fires across line.
17. Terrain and fuels make escape to safety zones difficult.
18. Taking a nap near the fire line.

Wildland-Urban Watch-outs

- Poor access and narrow one-way roads.
- Bridge load limits.
- Wooden construction and wood shake roofs.
- Inadequate water supply.
- Natural fuels 30’ or closer to structures.
- Structures in chimneys, box canyons, narrow canyons, or on steep slopes (30% or greater).
- Extreme fire behavior.
- Strong winds.
- Evacuation of public (panic).

Source: USFS Incident Response Pocket Guide
January 2002

LCES Checklist

LCES must be established and known to **ALL** firefighters **BEFORE** needed.

---------- **Lookout(s)** ----------

Experienced/Competent/Trusted
Enough lookouts at good vantage points
Knowledge of crew locations
Knowledge of escape and safety locations
Knowledge of disengagement trigger points
Map/Weather Kit/Watch/IAP

---------- **Communication(s)** ----------

Radio frequencies confirmed
Backup procedures and check-in time established
Provide updates on any situation change
Sound alarm early, not late

---------- **Escape Route(s)** ----------

More than one escape route
Avoid uphill escape routes
Scouted: Loose soils/Rocks/Vegetation
Timed: Slowest person/Fatigue and Temperature factors
Marked: Flagged for day or night (NFES 0566)
Evaluate: Escape time vs. Rate of spread
Vehicles parked for escape

---------- **Safety Zone(s)** ----------

Survivable without a fire shelter
Back in clean burn
Natural Features: Rock Areas/Water/Meadows
Constructed Sites: Clearcuts/Roads/Helispots
Scouted for size and hazards
Upslope?
Downwind? More heat impact ----- Larger safety zone
Heavy Fuels?

Escape time and safety zone size requirements will change as fire behavior changes.

Source: USFS Incident Response Pocket Guide
January 2002

Common Denominators of Fire Behavior on Tragedy Fires

- Incidents that happen on smaller fires or on isolated portions of large fires.
- Fires that look innocent before “flare-ups” or “blow-ups”. In some cases, tragedies occur in the mop-up stage.
- Flare-ups that generally occur in deceptively light fuels.
- Fires run uphill surprisingly fast in chimneys, gullies, and on steep slopes.
- Wind in which direction or wind speed unexpectedly shifts.

Source: USFS Incident Response Pocket Guide
January 2002

Structure Go-No Go / Protection Reference

Factors that may make a structure too dangerous to protect: If you answer, "yes" to any of the below, don't attempt to protect that structure, move on to the next.

- Fire is making a sustained run and there is little or no clearance.
- Water supply will not last as long as the threat.
- Fire's intensity dictates leaving the area immediately.
- The roof is more than one-quarter involved.
- There is fire inside the structure or windows are broken.

If the conditions listed above allow for a structure protection effort to be made then:

- Check roads before the fire arrives. Know turnouts, and bridge limits.
- Check each home for an adequate defendable space.
- Stay mobile; keep vehicle engine running, and red lights on.
- Back in equipment for a quick escape.
- Brief resources on strategies, tactics, hazards, and LCES.
- Coil a short 1½ " charged line with a fog nozzle on your engine for safety and quick response.
- Use short hose-lays.
- Keep at least 10% gallons of water in your tank.
- Determine if residents are home.
- Advise residents of escape routes, safety zones, evacuation plans and centers.
- Ask residents to evacuate threatened livestock or pets.
- Leave home lights on inside and out, day and night.
- Place owners ladder at a corner of the structure least threatened by the fire.
- Coil and charge garden hoses.
- Turn on sprinklers.
- Identify hazards. (HazMat, gas lines, power lines, etc.)
- If a home becomes involved, leave it and move to one you can save.

Firefighter safety and survival are the number one priority.

Source: BLM Red Book
January 2003

Pre-Incident Assignment Checklist

Southern California Deployment

☐ **Roster** (identify resource designators, and names for all personnel assigned to this deployment)

☐ **Order and Request Number(s)** (identify the specific Order and Request number(s) for all resources and/or Overhead assigned from your agency)

☐ **Location of Incident(s), Legal Description(s), and Map Reference(s)** (include travel route(s), and itinerary)

☐ **Topography** (include surrounding area(s)) (identify, and discuss the type of terrain, including aspect, and elevation for this incident(s))

☐ **Fuel Type(s)** (identify, and discuss fuel model(s) involved, please see attachment)

☐ **Weather** (review current and predicted weather forecasts for this deployment)

☐ **Fire Behavior** (If known, review any current, and predicted fire behavior that may be encountered by fire suppression personnel)

☐ **Communications** (review all mobile, and H.T. frequencies used for travel, and/or incident activity, discuss potential for 800 MHz, UHF, and VHF conflicts)

☐ **Ordering Point, and/or Communications Center Contact** (identify communication contacts for a Single/Unified Ordering Point, Emergency Communications Center(s), and/or incident location(s), include frequencies, and available landline and/or cell phone number(s))

☐ **Logistical Support** (identify any fire stations, mobilization centers, motels, restaurants, etc. that may be used for logistical support either during travel, or incident)

☐ **PPE Check** (inspect all personal protective equipment for completeness, and serviceability)

☐ **Equipment Check** (inspect vehicles, complement, supplies, etc. for completeness, and serviceability, discuss potential for foodstuff contamination, and spoilage)

☐ **Safety Message(s)** (**L**ookouts, **C**ommunications, **E**scape **R**outes, **S**afety, 18 Situations, 10 Standard F.I.R.E.O.R.D.E.R.S., etc.)

☐ **Documents** (inspect, and ensure adequate supplies, and correct version of all travel, financial, personnel, and incident documents)

☐ **Agency Documentation** (ensure the documentation of <u>all</u> safety messages; tailgate sessions, etc. in accordance with California Code of Regulations, Title 8 requirements)

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☐ _____

Notes:

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Lookouts Communications Escape Routes Safety Zones